

# **Data requirement of stock assessment**

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Data used in stock assessments can be classified as fishery-dependent data or fishery-independent data.

### **(i) Fishery-dependent data**

*Fishery-dependent data* is collected from the fishery itself, using both commercial and recreational sources. There are a variety of methods for obtaining fishery-dependent data. The most common approach is to use recorded landings. Landings are a record of the amount of fish sold and the numbers are typically reported in total weight. Another common mode for acquiring fishery-dependent data is through portside sampling of the catch of both recreational and commercial fishermen to obtain age and length information on the stock. Other less common methods for obtaining data is through the use of onboard observers, self-reporting, telephone surveys, and vessel-monitoring surveys.

### **(ii) Fishery-independent data**

Fishery-independent data is obtained in the absence of any fishing activity. The majority of this data is collected by state and federal agencies. A wide variety of methods and gear types are used to acquire fishery-independent data. Sampling equipment can include trawls, seines, acoustic and/or video surveys. The study may focus on a single species, multiple species, or a specific age range or cohort. Regardless of the method or approach, these surveys provide managers with an estimate of abundance. Mark and recapture studies are commonly used to estimate movement, migration, growth rate, natural mortality,

and discard mortality. Stock assessments are often completed using both fishery-dependent and fishery-independent data.

Stock assessments provide fisheries managers with the information that is used in the regulation of a fish stock. Biological and fisheries data are collected in a stock assessment.

### **(iii) Biological data**

The *biological* data include details on the age structure of the stock, age at first spawning, fecundity, ratio of males to females in the stock, natural mortality (M), fishing mortality (F), growth rate of the fish, spawning behaviour, critical habitats, migratory habits, food preferences, and an estimate of either the total population or total biomass of the stock.

### **(iv) Fisheries data**

The fisheries data include the kinds of fishermen in the fishery, commercial versus recreational, and the gear used, amount of fish caught by fishing, age structure of the fish sex ratio, how the fish are marketed, the value of the fish to the different fishermen groups, and the time and geographic location of the best catches. Further, geographical boundaries of different stocks or populations are also defined in the assessment.

From the combined biological and fisheries data, the current status and condition of the stock is defined and managers use this assessment to predict how in the future, stocks will respond to varying levels of fishing pressure. Ultimately, managers want to reduce the levels of overfishing that occurs and restore stocks that have been overfished.

For fish stock assessment studies, the growth of the fish and its age form the most necessary primary data. The age and growth data of a stock goes as input parameters for the estimation of growth parameters and mortality parameters. These two parameters along with selection parameters goes as input data for prediction models which will be dealt in the coming chapters.

Fish stock assessment should be made sex-wise / stock-wise separately. The results should be subsequently pooled for optimization of assessment.

## **Basic elements for the description of a fishery**

a. The input data, namely fishing effort. (Fishing effort is the product of the amount of gear in use times the duration of fishing activity.)

Examples are – Trawling hours, trap days, diving hours, hook hours etc.

b. The output data i.e. fish landed in fish landing centres and

c. Process which link the input and output data. Usually processes consist of biological process and the fishing operations.

Models are processes that connect input and output data. Prediction could be made possible by processing input data by using models. In general stock assessment models are grouped into two.

1. Analytical model

2. Holistic model (eg. surplus production model, box model, swept area method)

**(i) For Analytical model**

Input – Age data (by hard parts, length frequency data (LFD or tagging)).

Process – Estimation of age and growth using the hard parts, LFD data.

Growth parameters

Mortality parameters

Selection parameters

Process – Yield estimation by different values of fishing mortality for a range of exploitation levels.

Output - Estimation of MSY, standing stock biomass. Relative yield per recruit and to ascertain optimum mesh size of net for a given stock in question.

**(ii) For Surplus production model**

Input: Catch and effort.

Process: Estimation of CPUE for different years.

Output: MSY, FMSY

**(iii) For swept area method**

Input: Survey data in a fleet

Process: Estimation of swept area (velocity of trawl over ground when trawling, hr is the length of the head rope, time spent, wing speed etc.)

Output: Prediction of total biomass of a resource in a given area / coast.